



Outcomes in neurodevelopmental and genetic disorders



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Contents

List of contributors	vii
Preface	ix
1 Attention deficit hyperactivity disorder Jody Warner-Rogers	1
2 Developmental language disorders Nancy J. Cohen	26
3 Reading and other specific learning difficulties Arlene R. Young and Joseph H. Beitchman	56
4 Metabolic disorders Anupam Chakrapani and John Walter	74
5 Hemiplegic cerebral palsy Robert Goodman	112
6 Autistic disorders Patricia Howlin	136
7 Down syndrome Janet Carr	169
8 Fragile X syndrome Randi J. Hagerman and Paul J. Hagerman	198
9 Prader-Willi and Angelman syndromes: from childhood to adult life Anthony Holland, Joyce Whittington and Jill Butler	220
10 Rett disorder Alison Kerr	241

vi Contents

11	Tuberous sclerosis Petrus J. de Vries and Patrick F. Bolton	272
12	Williams and Smith-Magenis syndromes Orlee Udwin	299
	Index	327

Attention deficit hyperactivity disorder

Jody Warner-Rogers

Attention deficit hyperactivity disorder (ADHD) is one of the most prevalent psychiatric disorders of childhood. Although once a vigorously debated issue, it is now accepted that ADHD can be reliably distinguished from other behavioural problems in childhood and adolescence (Goldstein, 1999). The disorder is also recognized as existing beyond childhood (Tannock, 1998), resulting in the need for clinicians to increase their understanding of the various developmental outcomes and age-related changes in presentation and response to treatment.

This chapter begins by summarizing the research and clinic-based evidence regarding the nature of ADHD. The manner in which the disorder can affect individuals as they mature from childhood to adulthood is then discussed and various intervention strategies are presented.

Diagnostic classifications and prevalence

An important difference exists between simple hyperactivity, which describes a tendency to behave in an inattentive, overactive and impulsive way, and the psychiatric diagnostic category of ADHD. Most children are hyperactive in some situations. Indeed, hyperactivity is a trait, not unlike intelligence, that appears to be normally distributed in the general population (Taylor et al., 1991). However, in most children, their behaviour is regulated by environmental demands. This influence, and accompanying behavioural control, increases with age and maturity. Society expects increased behavioural control as children develop. At school, for example, a 5-year-old child might be expected to sit quietly listening to a 10-minute story, whereas a 15-year-old child would be required to sit and attend for a 45-minute lesson.

Some children consistently exhibit hyperactive behaviour across many situations and appear to have difficulty modifying their behaviour in response to their environment. These children exhibit levels of inattention, impulsiveness and overactivity that can actually impair their functioning in one or more areas

(e.g. academic, social). When such difficulties are early in onset (before the age of 7 years), persistent over time (at least 6 months), pervasive across situations (evident in at least two different settings), and, importantly, out of keeping with their general developmental level (global intellectual functioning), a psychiatric diagnosis may be appropriate.

The two main current classification schemes, namely the fourth edition of the *Diagnostic and Statistical Manual* (DSM-IV), published by the American Psychiatric Association (APA, 1994), and the tenth edition of the *International Classification of Diseases* (ICD-10), published by the World Health Organization (WHO, 1994) both contain a disorder characterized by a cluster of three core behavioural symptoms: inattention; hyperactivity; and impulsivity. However, the two schemes differ in important ways and it is these differences that have contributed, in part, to the different ways in which the symptoms have been conceptualized and managed in Europe and North America. Both the DSM-IV and ICD-10 classification schemes are now used in the United Kingdom (UK).

Currently, the DSM-IV lists ADHD as a primary disorder. However, the scheme allows for the subtyping of the disorder based on the predominance of symptoms: ADHD Combined Type (all three core symptoms present); ADHD Predominantly Inattentive Type; and ADHD Predominantly Hyperactive–Impulsive Type. In contrast, all three symptoms must be present for a child to meet criteria for an ICD-10 diagnosis of Hyperkinetic Disorder (HKD). Thus, all children with a diagnosis of ADHD or HKD exhibit hyperactivity. Moreover, all children with HKD would meet criteria for ADHD Combined Type but those with ADHD Predominantly Inattentive Type or Predominantly Hyperactive–Impulsive Type would not meet the more stringent criteria for HKD. Prevalence figures for disorders, therefore, will vary depending on which diagnostic scheme is being used and whether or not the subtypes in the DSM-IV are being applied.

Approximately 1.7% of children meet criteria for HKD (Taylor et al., 1991). In comparison, ADHD, a more broadly defined disorder, affects 3–5% of children (Szatmari, Offord & Boyle, 1989). The ratio of affected boys to girls is around 4:1 (Ross & Ross, 1982; James & Taylor, 1990). Hyperactivity is more common in urban than rural areas (Taylor et al., 1991). Links exist between hyperactivity and pervasive developmental disorder (PDD) in that children with autistic spectrum disorders can be very hyperactive. However, in the hierarchy of diagnoses, PDD is given priority in such cases. The treatment of hyperactive behaviour in a child with a pervasive developmental disorder may be quite different to that used in straight forward cases of ADHD.

The diagnosis of either ADHD or HKD, is based on patterns of behaviours,

3 Attention deficit hyperactivity disorder

not aetiological factors, and involves the ruling out of alternative, differential diagnoses such as autism. The issue of comorbidity, however, is addressed differently in the DSM-IV and ICD-10. The DSM system allows for multiple diagnoses to be given (e.g. ADHD *and* Conduct Disorder; or ADHD *and* Generalized Anxiety Disorder), but the ICD system views HKD as a relatively rare condition that occurs in isolation. When other problems are also present to a significant degree, then other diagnoses may be given (e.g. Hyperkinetic-Conduct Disorder or Mixed Disorder of Conduct and Emotion).

This chapter will use the terms hyperactivity and ADHD interchangeably to imply the presence of developmentally inappropriate levels of inattention, overactivity and impulsiveness. However, it is important that readers appreciate the subtle differences in the way terms are used within professional and lay circles.

Nature of the disorder

Hyperactive behaviour can be relatively easy to operationalize and quantify. Rating scales or direct observations can provide reliable measures of the occurrence and frequency of selected behaviours (e.g. number of times a child is out of his/her seat during a lesson; percentage of a task completed; frequency of calling out in class without raising a hand). In contrast, it has proven considerably more difficult to identify the specific cognitive delays, deficits or dysfunctions that might underpin these behaviours. Indeed, much of the recent research in the field has focused on the identification of cognitive and genetic factors, as well as the identification of abnormalities in brain structure and function (see Tannock, 1998, for a review).

Despite the name attention *deficit* hyperactivity disorder, children with ADHD do not necessarily have a deficit in their cognitive attentional processes, even though they may exhibit behaviours that are suggestive of cognitive inattentiveness, such as frequently changing activity or being easily distracted. Experimental studies indicate that the primary problem in ADHD is not one of a poor level of attention, or inability to sustain it or a failure selectively to attend (Taylor, 1995). Rather, research evidence is converging to support the theory that the underlying deficit lies in a problem with behavioural inhibition and self-regulation (Taylor, 1994).

Behavioural inhibition has been seen as three inter-related processes: (1) the inhibition of a prepotent response; (2) the cessation of an on-going response such that a delay occurs which allows an individual to make a decision about the response; and (3) the ability to maintain this delay and prevent other events

and responses from interfering with the self-directed responses that are happening within it (Barkley, 1997a). Those areas of the brain that control attention and the organization of responses, namely the frontostriatal areas, are being extensively investigated.

It is quite possible that children with ADHD Primarily Inattentive Type differ in terms of aetiology, prognosis and response to treatment from children with ADHD Primarily Hyperactive–Impulsive Type or those with ADHD-Combined subtype. Although the inattentive behaviours may be topographically similar across the subtypes, the nature of the cognitive attention deficit may be quite different. In particular, the inattentive subtype appears more closely linked to educational difficulties (Warner-Rogers et al., 2000) and socio-economic disadvantage (Taylor et al., 1991). These children tend to be described by their teachers as inattentive and dreamy, but not particularly overactive or impulsive (Taylor et al., 1991). Many researchers now argue that children with ADHD Primary Inattentive Type should not be included in the same study groups as ADHD Combined Type (Barkley, 1997a).

In a book written primarily for parents raising a child with ADHD, Barkley (1995) provides a useful summary of the cognitive nature of the disorder and the associated behavioural symptoms. In terms of their *attentional* functioning, Barkley (1995) notes that children with ADHD have: (1) difficulty sustaining attention; (2) get bored or lose interest in work faster than other children; and are (3) drawn to the most rewarding, stimulating or fun feature of any situation – a tendency that can make them appear easily distractible. With regards to *impulsive* behaviour, children with ADHD have difficulty controlling their impulses and deferring gratification. These tendencies can lead to: (1) more risk taking; (2) impulsive thinking; and (3) problems managing money. The *hyperactivity* aspect is described as ‘a problem with too much behaviour’ (Barkley, 1995: p. 36). Children with ADHD are both more physically active and respond to more aspects of their environment than non-ADHD children, making them seem ‘hyper-responsive’. Finally, these children have difficulty with following instructions and working consistently. All of these behavioural symptoms are linked theoretically and reflect a disorder of self-control, and the ability to organize and direct behaviour towards a future goal (Barkley, 1995, 1997a).

Aetiology of the disorder

The development of ADHD in any given individual is likely to be multifactorial (Taylor, 1998). Genetic contributions, neurobiological factors, illness or injury, psychological variables and environmental factors may all play a role.

Tannock (1998: p.65) describes ADHD as 'a paradigm for a true biopsychosocial disorder', reflecting the complex relations and interactions between genetic, biological and environmental factors.

Twin studies indicate that the tendency to behave in a hyperactive manner is highly heritable (e.g. Goodman & Stevenson, 1989a,b; Silberg et al., 1996). Pervasive hyperactivity is more concordant in monozygotic than in dizygotic twins. Goodman & Stevenson (1989a,b) found concordance rates of 51% in monozygotic twins compared to 30% in dizygotic twins. Several possible genetic mechanisms are currently being explored, including variations in the dopamine 4 receptor gene (LaHoste et al., 1996). Current consensus among genetic researchers suggests that inherited variants of those genes that function to modulate dopaminergic neurotransmission may contribute to changes in the structure and function of particular brain regions. These changes in function at the neurological level may give rise to the abnormalities in psychological functioning, characterized by difficulties in inhibiting inappropriate responses (Taylor, 1999a).

However, genetic research highlights the impact that other, non-genetic factors, particularly non-shared aspects of a child's environment, can have on the developmental course of the disorder. Epidemiological research indicates that ADHD is not associated with minor obstetric abnormalities at birth (Taylor et al., 1991); however, prenatal exposure to alcohol is linked with hyperactive behaviour (Taylor, 1991). Other factors, such as maternal smoking during pregnancy and pre-eclamptic toxemia are also associated with hyperactivity, although the exact mechanisms of the effect have not been firmly established (see Taylor, 1999a). Very low birth weight, severe anoxia, and early lead poisoning are also risk factors for the later development of ADHD. Problems related to family function may not give rise to ADHD symptoms per se, but can affect the development of conduct problems in children with ADHD (Taylor, 1999a), which in turn has implications for outcome.

Findings from magnetic resonance imaging (MRI) studies indicate that ADHD is associated with changes in brain morphology. However, the results from different studies have been contradictory at times and the disparate findings across some studies are believed to reflect the true heterogeneity of aetiological routes to ADHD symptoms (see Eliez & Reiss, 2000, for a review). There is a tendency for total brain volume to be slightly lower in children with ADHD compared to controls (e.g. Castellanos et al., 1996), with particular reductions in the white matter of the right frontal region (Filipek et al., 1997). Abnormal morphologies of the basal ganglia, corpus callosum and cerebellum have also been suggested, but the results across studies remain conflicting with regards to the exact pathology (Eliez & Reiss, 2000).

ADHD in childhood

Although the diagnostic criteria state that at the minimum, the three core behavioural symptoms – inattention, hyperactivity and impulsivity – must be present by the age of 7 years, in many cases the behavioural disturbance is evident much earlier in the child's development. In the pre-school years, many children are inattentive and can exhibit behaviours that are difficult to manage. However, the demands for sustained attention on pre-schoolers are limited and certainly not all difficult-to-manage young children will go on to develop ADHD. None the less, Cohen and colleagues (1981) suggest that 60–70% of children who are later diagnosed as having ADHD exhibited the characteristic behavioural symptoms by their pre-school years. Parental reports of hyperactivity at the age of 3 years have also been associated with the later presence of conduct problems (e.g. Campbell, 1987).

Speech and language difficulties are very common in young children with ADHD (Baker & Cantwell, 1987; Taylor et al., 1991). Poor motor co-ordination and delayed reading skills are also frequent (e.g. Taylor et al., 1991). Young children with hyperactivity are likely to be more impersistent in their activity, change activities frequently, and explore their environments in an unsystematic and disinhibited manner (Luk, Thorley & Taylor, 1987).

By the time children enter formal education, around the age of 4–5 years, they are expected to have some capacity for concentration and behavioural control. Even in reception classes, children are required to sit quietly for periods of time listening to stories or instructions. At this early stage in education, although the day is clearly structured and organized for them, the children still need to learn to modify their behaviour in accordance with the demands of the environment – lessons and assembly necessitate settled behaviour, playtime allows for more boisterous activity. Children must learn to socialize with other children – to wait their turn and to share the attention of the adult. Children who have difficulties with attention, activity control and impulsiveness struggle with the limits placed on them in the early school environment. It is often at this point that the characteristic difficulties begin to be formally recognized.

As children progress through the primary school years, the lessons become more structured and children are expected to begin to acquire the basic foundations for literacy and numeracy. The demands for behavioural control within this environment steadily increase and unmodulated and inattentive behaviour will pose an increasing impediment on a child's ability to function effectively at age-level expectations (Taylor, 1995). The rapid and often chaotic

style with which children with ADHD tend to process information can impair their ability to learn. This in turn means that they may not develop their knowledge base at the same rate as their peers. As other children are consolidating new skills and applying them in their classroom work, the children with ADHD may be unable to keep up. As tasks become increasingly difficult for them, rates of inattentive and disruptive behaviours may increase. Socially, their peers may begin actively to reject them as their behaviour becomes more intrusive and disruptive.

In secondary school, the demands on independent learning and self-organization are considerably higher than in primary school. Children with ADHD are at risk of becoming disaffected with education if they cannot cope with these demands. Problems with peer relationships or compliance may become exacerbated. Some children will, by this stage, already have had their ADHD diagnosed and be linked into appropriate treatment services. However, the needs of these children will change as they mature and their progress must be carefully monitored at regular intervals.

Other youngsters will reach adolescence with their difficulties as yet unrecognized and untreated. Their poor inhibition and attentional skills render them ill-equipped to master the developmental tasks of adolescence. Why had their problems not been identified earlier? Some children may have coped successfully, having benefited from other strengths and supports, such as high general intelligence, a good primary school, or a supportive, accepting family. In other cases, the children might have had such disrupted early lives (e.g. neglect, abuse, multiple foster placements) that the professionals involved in their care had focused on these factors as the most likely cause of any dysfunctional behaviour, and thus overlooked the possibility of a neurodevelopmental problem.

Associated difficulties in childhood

Although the core behavioural symptoms in children with ADHD cause impairment in functioning, these are not the only aspects of their development that jeopardize educational attainment. Recent reviews suggest between 50 and 80% of children with ADHD will also exhibit another disorder (see Jensen, Martin & Cantwell, 1997). Oppositional Defiant Disorder and Conduct Disorder are the most frequently co-occurring problems, with estimates of comorbidity ranging from 40 to 90% (Jensen et al., 1997). Another common problem is academic underachievement, with reading difficulties occurring in about one-third of clinic-referred children with ADHD (August & Garfinkel, 1990).

Poor peer relationships are another frequently encountered area of difficulty

(Pelham & Milich 1984), though the actual deficits in social skills functioning can vary widely. Some children with ADHD are very good at making friends, but have difficulty keeping them. Other children struggle to make appropriate overtures to children and are actively rejected or neglected by their peers (Nixon, 2001). Children with ADHD have a tendency to be more dominating and aggressive in their social interactions (Guevremont, 1990) and their impulsiveness can affect their ability accurately to process social cues and information (Milich & Dodge, 1984).

As children with ADHD tend to be frequently in trouble with adults, be unpopular amongst their peers, and do poorly at school, they often develop a low self-image. Emotional disturbance, including mood disorders and anxiety problems, may affect 15–25% of children with ADHD (Jensen et al., 1997). Collectively, ADHD and the associated difficulties can pose a major risk to a child's potential to succeed in school, to view themselves as a valued member of the family, peer group or wider community, or to develop a positive sense of self-worth. Clearly, therefore, the assessment of ADHD must address symptoms beyond the three core problems.

Historically, it was believed that when conduct problems were comorbid with hyperactivity, it was the conduct difficulties and not the hyperactivity that posed the greatest risk to development. It is now recognized that hyperactivity itself is a risk for poor psychosocial adjustment in adolescence and adulthood (Taylor et al., 1996) although the presence of comorbid difficulties may play a critical role in later functioning (Goldstein, 1999). It is not clear yet whether or not cases of ADHD that present comorbidly with other disorders, particularly conduct problems or anxiety, should be conceptualized and treated substantially differently from cases in which ADHD occurs in isolation. Certainly, the outcome for comorbid cases appears more negative (Barkley et al., 1993). The presence of comorbid disorders may also alter the response to treatment. Longitudinal research, in which comorbidity has been identified and classified more systematically, will hopefully address these issues.

Transition into adolescence

Until recently, parents of a child with hyperactivity were often reassured that their child would 'outgrow it'. In some cases, this is true – in general, the level of ADHD symptoms, particularly overactive behaviour, does decrease with time (Hill & Schoener, 1996). However, longitudinal studies that were published in the late 1980s and early 1990s, dispelled the idea that *most* children would outgrow their hyperactivity problems. To some degree, the majority of children with ADHD will continue to experience the core symptoms of the disorder into early adolescence and they remain at risk of developing other

behavioural and relationship difficulties (Hinshaw, 1994). Indeed, less than a third of children with hyperactivity will outgrow their difficulties by late adolescence (Barkley et al., 1990).

Although not all these children may meet diagnostic criteria, residual, subclinical symptoms of the disorder, such as poor organization or rapid decision-making may remain aspects of their personality. These may or may not impair functioning but professionals are now suggesting that ADHD should be seen as a chronic problem that requires specific support and treatment over many years (Goldman et al., 1998). Some have even implied that ADHD should be viewed as a lifelong condition (Fargason & Ford, 1994).

Associated difficulties in adolescence

The two-thirds of children whose ADHD symptoms continue into adolescence are at increased risk for developing other disruptive behaviour problems, particularly aggression, oppositionality, antisocial behaviour and delinquency (Gittelman, et al., 1985; Barkley et al., 1990; Taylor et al., 1996). Poor academic performance and educational underachievement are additional serious problems (Fischer et al., 1990). Social incompetence and emotional maladjustment are also characteristic of children whose ADHD is identified for the first time in adolescence (Barkley et al., 1991). Substance abuse problems appear to be more associated with the development of conduct difficulties in adolescence (Gittelman et al., 1985). Adolescents with a history of attentional and hyperactivity problems also have a higher rate of driving accidents and other traffic violations (Cox et al., 2000; Woodward, Fergusson & Horwood, 2000).

Of the three core symptoms of ADHD, hyperactivity is the most likely to decrease with time, whereas difficulties with impulsivity and inattention are more likely to persist. When considering the longitudinal course of the disorder and its impact on development, one must separate the actual continuity of the core behavioural symptoms from the disturbance in functioning that might arise in reaction or response to these symptoms. These secondary difficulties may persist even if the core ADHD problems eventually remit.

Longitudinal studies, in documenting the developmental course of ADHD, have firmly established that childhood hyperactivity is a risk factor for future adjustment and behavioural difficulties. However, the exact mechanism whereby hyperactivity functions as a risk factor remains less well understood and this is now an area of intensive research. It is possible, for example, that other factors, such as how people respond to the child and how behavioural difficulties are managed, play an important role in the development and maintenance of future problems (Barkley, 1998).

ADHD in adulthood

Although professionals in the UK are becoming increasingly aware of the importance of assessing and treating *children* with ADHD (see Sayal & Taylor, 1997), services dedicated to the mental health needs of adults may be less well-informed. Wender (1998a: p. 761) recently described ADHD as 'probably the most common chronic undiagnosed psychiatric disorder in adults'. Although its very existence in adulthood remains controversial amongst some professionals, reviews of the current literature indicate that the disorder can be reliably diagnosed in adults and that it has a definable course and response to treatment (Spencer et al., 1998). None the less, like other developmental disorders and psychiatric illnesses originating in childhood, the presence of ADHD can remain unnoticed by adult psychiatrists (Burger & Lang, 1998). A recent survey of adult psychiatrists in the Trent region in England suggests that few felt they were seeing cases of ADHD (Bramble, 2000). This implies that many adult mental health services may be ill-prepared to deal with the increasing number of young adults who will require assessment and treatment of ADHD. As ADHD becomes increasingly recognized as a chronic, possibly life-long, condition, more services will need to be developed to address the needs of this population.

The presence of hyperactivity in childhood is associated with hyperactivity and poor social and academic adjustment in early adulthood in both community, non-referred samples (Taylor et al., 1996) and clinic-based populations (Lambert, 1988). Mannuzza and colleagues (1991), in their follow-up of children diagnosed with ADHD, found that almost half (43%) of their sample continued to meet diagnostic criteria for ADHD as young adults. Moreover, one-third of their sample met diagnostic criteria for antisocial personality disorder and one-tenth were abusing drugs. A recent study, comparing a clinically referred sample of adults with ADHD to a clinic-referred control group, highlighted the increased psychiatric and social morbidity of the ADHD group. The adults with ADHD were more impaired on measures of academic achievement and both antisocial and criminal behaviour (Young, Toone & Tyson, unpub. data). Prospective studies (e.g. Satterfield & Schell, 1997) indicate that the risk of adult criminality is mediated predominantly by the presence of conduct problems which may also be associated with hyperactivity. Children with hyperactivity, but no conduct problems, are not at increased risk for criminality in adulthood.

Poor peer relationships and lack of participation in constructive activities are also common in young adults with ADHD (Taylor et al., 1996). Not sur-

prisingly, occupational status may be affected. Compared to other family members, individuals with ADHD may have lower-status occupations and more job-related problems than non-affected individuals (Young, 2000).

The risk of ADHD appears to continue into an individual's early 20s and 30s, with one study suggesting that more than half of those adults with a history of childhood hyperactivity will continue to exhibit at least one 'disabling' symptom of hyperactivity (Weiss et al., 1985). These individuals tend to have a more immature and explosive personality type (Weiss & Hechtman, 1986). They may also have a history of self-medicating with stimulants, such as caffeine or amphetamines (Wender, Wood & Reimherr, 1985).

Assessment of ADHD

Children and adolescents

The frequent presence of comorbid difficulties highlights the need for a comprehensive and multidisciplinary approach to the assessment and treatment of ADHD. A multi-modal, multi-informant approach to assessment of hyperactivity is absolutely necessary. The purpose of assessment is to identify the presence of the behavioural symptoms, quantify the severity and impact of the symptoms, detect any comorbid difficulties, rule out alternative diagnoses and develop a formulation that will lead to a comprehensive treatment plan. Several current sources provide detailed guidelines on assessment and diagnosis (Barkley, 1998; Goldman et al., 1998; Taylor et al., 1998; Warner-Rogers, 1998).

For children and adolescents, a diagnostic assessment should include the following six components: (1) clinical interview including detailed developmental history and in-depth description of current problems and their development; (2) physical examination; (3) behavioural observation and interview of child; (4) psychological assessment, or at the minimum a screen for global learning delay or specific learning difficulty; (5) completion of rating scales and behavioural questionnaires by parents and at least one other informant who knows the child well (such as a health visitor, nursery worker, or teacher); and (6) review of school records from all schools attended, including nursery and reception where available.

The purpose of the detailed history is to establish if the developmental course of the symptoms would be consistent with ADHD. Information about family functioning and problems such as financial difficulties, marital strife, as well as details about existing sources of support, will also be important (Taylor et al., 1998). The physical assessment should involve a general physical examin-

ation, screen for congenital disorders or evidence of immaturity in motor function, and document height, weight and head circumference. More specific medical investigations are not always needed, but may be indicated if any problems are identified in the general physical examination (Taylor et al., 1998).

Behavioural observation of the child or adolescent allows one to ascertain how they modify their behaviour in relation to environmental demands. It is important to note, however, that novel situations, such as an appointment in an outpatient clinic, may often suppress symptoms of hyperactivity. A lack of hyperactive behaviour in new situations should not be construed as evidence of its non-existence in other environments. Likewise, the clinical interview with the child or adolescent is an important component of the assessment process. Children can present their views regarding their emotional and social functioning and give an impression of how other people seem to be reacting to their behaviour. Adolescents tend to be poor sources of information regarding ADHD symptoms. Teenagers tend to underreport difficulties in the areas of inattention, impulsivity and overactivity (Danckaerts et al., 1999), but can provide important, valid reports about the nature of social interactions (Smith et al., 2000).

As the diagnosis of ADHD requires the behavioural symptoms to be inconsistent with the developmental level of the individual, an accurate understanding of an individual's general level of functioning is required. A comprehensive cognitive assessment will serve to identify the level of development. Evaluation of a child's academic attainment allows one to consider the presence of any specific learning disorders. Specialized neuropsychological assessment can provide data on cognitive attention abilities and response inhibition. Other areas, such as memory and visuospatial skills can also be examined. In general, decisions about the necessity for detailed neuropsychological assessment should be made on an individual basis. There is no one neuropsychological profile that is characteristic of ADHD. Indeed, it is important to emphasize that the diagnosis is based on behavioural symptoms and not any pattern of cognitive deficit.

A number of rating scales can be useful as screening devices to supplement detailed interviews. The Strengths and Difficulties Questionnaire (SDQ) is a good general behaviour screening measure as it taps behavioural, emotional and social functioning and includes positive as well as negative attributes (Goodman, 1997). The SDQ has forms for parents, teachers and young people (age 11–16 years), so views across informants can be compared. The Conners Rating Scales (Conners, 1969) were designed specifically for hyperactivity and are very sensitive to medication effects, making them ideal for monitoring

behaviour change during treatment. The Home Situations Questionnaire (HSQ) and School Situations Questionnaire (SSQ), developed by Barkley (1997b) are expressly for hyperactivity and focus on specific settings, such as mealtimes or travelling, that may be problematic. One must remember, however, that it is not uncommon for two respondents to provide disparate ratings for the same individual. This may reflect true variation in behaviour across settings or the different expectations of the raters from different settings.

The views of the school are essential for a complete ADHD assessment. The diagnosis requires pervasiveness of symptoms across situations, and teachers can provide critical information about how the child's attention and behavioural control skills compare to others within the same environment. Moreover, soliciting the input of teachers and educational professionals at the assessment phase may serve to enhance their willingness to support and collaborate with treatment later.

Adults

There are, at present, no separate diagnostic criteria for adult ADHD (Wender, 1998a). As such, the goals of assessments for adults who may have ADHD are almost identical to those that apply to children. The methods, however, vary slightly. The first National Health Service clinic in the UK dedicated to ADHD in adulthood attempts to gather information from four sources: (1) parent/informant report; (2) self-report; (3) objective retrospective information (e.g. school reports, police records, educational statements); and (4) psychometric assessment (Young & Toone, 2001).

For adults, the assessment must show that the individual experienced the core symptoms as a child. There is a semi-structured interview available that focuses on contemporary ADHD features (Barkley & Murphy, 1998). However, the developmental history, which necessitates the accurate recall of childhood behaviour, is obviously critical. One might speculate that it could be very difficult to gather information about early childhood functioning retrospectively. At least one study (Murphy & Schachar, 2000) has examined this issue by comparing recall of childhood behaviour from three sources: adults referred for assessment of possible ADHD; their parents; and their partners. Good correlations across informants were found for inattentive, hyperactive-impulsive symptoms. Although this suggests that adults may be accurate reporters of childhood behaviour patterns, it does contrast with low validity of the contemporary reports of adolescents. Until more research is completed regarding accuracy of retrospective reports, it may still be useful to include the views of parents or partners when possible. Review of all available school reports provides another source of information.

Assessment of cognitive and neuropsychological functioning also has a role in the evaluation of adults (Young & Toone, 2001). Psychological assessment and neuropsychological evaluation may support the diagnosis, but will not confirm or disconfirm it (Fargason & Ford, 1994). Although adults with ADHD have been shown to perform more poorly than controls on tests of neuropsychological functioning, scores on such tests alone cannot discriminate adults with ADHD from those with other psychiatric disorders (Downey et al., 1997; Walker et al., 2000). As with children, there is no one neuropsychological profile that captures the functioning of adults with ADHD.

Rating scales, such as the Wender Utah Rating Scale (WURS), are known to be sensitive to ADHD, but not necessarily specific to the disorder and reliance on rating scales alone would lead to high rates of misclassification (e.g. McCann et al., 2000). The Minnesota Multiphasic Personality Inventory, second edition (MMPI-2), has also been shown to be useful in the assessment of ADHD (Downey et al., 1997; Coleman et al., 1998), though the device is not generally widely used in the UK.

Treatment of ADHD

Interventions must go beyond simple symptom reduction. Treatment strategies can be used effectively to decrease behavioural symptoms and increase adjustment, although this is clearly not the same as 'curing' the problems. Thus treatment for ADHD includes, but should not be limited to, the reduction of core behavioural symptoms. Ideally, intervention should also focus on any comorbid difficulties or disorders by promoting academic and social functioning, enhancing self-esteem, preventing the development of conduct difficulties and relieving family distress (Taylor, 1994; Warner-Rogers, 1998). Given the heterogeneity in groups of children with ADHD, it is not surprising that treatment packages must be highly individualized, and generally there will be multiple targets for treatment.

Historically there have been three main treatment approaches to ADHD: pharmacological; psychological; and nutritional. The actual treatment options selected will vary depending on the targets of intervention. Services should not rely solely on one approach to intervention (Taylor, 1999b). Research efforts have focused primarily on pharmacological and psychological interventions and therefore these two options are reviewed here in more detail. Evidence for the effectiveness of any particular dietary approach is so limited that no guidelines for dietary treatment yet exist (Taylor et al., 1998). However, parents are generally reliable reporters of whether or not their children are

sensitive to particular foods (Young et al., 1987) and when such a food-behaviour link is suggested, a food diary approach is a non-intrusive way in which to explore the associations in more detail (Taylor et al., 1998).

Pharmacological intervention

In childhood and adolescence

Historically in the UK, medication has not been the treatment of choice, but there is now increasing consensus that it should be used to treat severe cases of hyperkinetic disorder and even some cases of ADHD (Sayal & Taylor, 1997). The main, first-line pharmacological treatment for ADHD is methylphenidate (Ritalin, Equasym), a stimulant medication (Taylor et al., 1998), and multiple treatment trials have demonstrated its efficacy in reducing the behavioural symptoms of ADHD (Swanson et al., 1993; MTA Cooperative Group, 1999b). However, children on medication must be monitored consistently and doses titrated carefully against behavioural response. In contrast to the UK, medication is the most common treatment in the United States (Safer & Krager, 1988), with estimates suggesting that approximately 88% of children with ADHD are prescribed methylphenidate (Wolraich et al., 1990). Current guidelines for European practice indicate that medication should be used in severe cases of ADHD, with milder cases being given home- and school-based treatments first, followed by medication if improvements are not forthcoming (Taylor et al., 1998).

In addition to treating the core symptoms, stimulant medication has been linked to decreases in general disruptive behaviour and increases in time spent on task (Pelham, et al., 1985). Increased attention during play activities (Pelham et al., 1990) and improvements in academic functioning have been observed with some children (Pelham et al., 1985; Evans & Pelham, 1991). The driving skills of older adolescents with ADHD may also be improved when taking methylphenidate (Cox et al., 2000). However, a small percentage of children experience adverse reactions to stimulant medication, including poor sleep, nervousness, sadness and appetite reduction (see Taylor et al., 1998, for review).

Methylphenidate is a very short-acting drug, which means that multiple doses are required during the day to achieve maximum benefit. This may pose difficulties as children must often take the medication during school hours. Some schools can be resistant to the notion of a medication approach to what they see as a behavioural problem, and be reluctant to co-operate with the medical regime. Adolescents can be especially sensitive to being stigmatized by having to regularly attend the office or school nurse for their medication.

This can lead to difficulties with adherence. A slow-release preparation of methylphenidate is now available which may circumvent some of these problems (Ford, Taylor & Warner-Rogers, 2000).

Taylor and colleagues (1998) provide a review of alternative stimulants and other types of medication that might also be effective. Briefly, dexamphetamine is a stimulant medication that is sometimes used, particularly for children who also have a seizure disorder. Desipramine, a tricyclic antidepressant, can also function as an anti-hyperactivity medication and is often considered when children have tic disorders as well as ADHD. Atypical antipsychotic drugs can also be used in special cases, but they are not first line choices and are generally less helpful than stimulants (Taylor et al., 1998).

In adulthood

As yet, there are no widely established or empirically validated protocols for the pharmacological treatment of ADHD in adults, though some general guidelines from the American Academy of Child and Adolescent Psychiatry (Dulcan, 1997) and other specialist clinics are available (e.g. Roy-Byrne et al., 1997). Treatment trials are underway, however, and preliminary evidence indicates that stimulant medications, including methylphenidate, dexamphetamine and Adderall (a mixture of amphetamine salts) can be effective with adults (e.g. Gualtieri, Ondrusek, & Finley, 1985; Wender, 1998b; Patterson et al., 1999; Horrigan & Barnhill, 2000) and should be considered first-line choices for pharmacological intervention.

Psychological approaches

In childhood and adolescence

There is a wide variety of 'psychological' approaches to treatment. The main focus of such interventions is to change the environment in order to alter the behaviour of the child. Some psychological techniques focus on the parent or teacher, others centre directly on the child. The techniques used might include: (1) educating parents, teachers and caregivers about the disorder in general and the child's needs in particular; (2) parent training in child management; (3) modifying educational provision; (4) consulting with teachers regarding cognitive-behavioural treatment for impulsiveness; and (5) direct intervention with children, e.g. attention training, anger management. Reviews of psychological approaches for children with ADHD can be found in MTA Cooperative Group (1999a), Goldstein (1997), Goldstein & Goldstein (1998) and Warner-Rogers (1998).

In adulthood

Education about the disorder, advice on coping strategies, individual counselling for improving self-esteem, organizational skills and anger control may also prove useful treatments for adults (Fargason & Ford, 1994), although the efficacy of these approaches has yet to be studied in detail. Young (1999) suggests that structured cognitive-behavioural therapy may be an extremely important component of work with adults with ADHD. This approach seeks to empower individuals to develop self-efficacy and the will to change and to teach self-management skills. Specific targets may include: impulse control; time-management and organizational skills; problem solving; anger control skills; and social awareness and interaction skills.

A comment on treatment effectiveness

The Multimodal Treatment Study of Children with Attention-Deficit Hyperactivity Disorder (MTA Study; MTA Cooperative Group, 1999a,b) summarizes the results from the most extensive randomized controlled treatment trial of ADHD in childhood to date. Subjects (children with ADHD aged 7–9.9 years) were assigned for 14 months to one of four treatment protocols: medication management; intensive behavioural treatment; the two combined; or standard community care. The behavioural treatment component of the MTA Study included parent training, child-focused treatment and a school-based intervention.

Children in all four groups of the MTA Study exhibited reductions in symptoms. However, the results indicate that closely monitored medication management was more effective than intensive behavioural treatment alone or standard community care in reducing core ADHD symptoms. The care, consistency and precision with which doses of methylphenidate were titrated against behavioural improvement for the children in the medication management treatment group of the study is worth highlighting. The combined treatment approach, including both medication management and behavioural treatment, provided no *greater* benefit for core ADHD symptoms than medication management alone. However, the combined approach was superior to intensive behavioural treatment alone as well as community care in other areas such as oppositionality, aggression, family relationships and academic functioning, whereas medication management was not. In addition, those children who received the combined treatment approach could be maintained on lower doses of medication than those in the medication alone group. It is also noteworthy that over 75% of those subjects in the behavioural treatment group were maintained without any medication throughout the study. In addition,

treatment satisfaction scores for the combined treatment and the intensive behavioural treatment were significantly higher than the satisfaction scores from the medication alone group.

The MTA Group went on to examine the moderators and mediators of treatment response, and in so doing highlighted the relative importance of comorbidity (MTA Group, 1999b). Specifically, children with anxiety problems fared better in the behavioural treatment group than in the community care group with regards to their core ADHD symptoms. For children from families of lower socio-economic backgrounds, the combined treatment resulted in more improvements in teacher-reported social skills.

The MTA Study was undertaken in the United States and one must take care when generalizing the results to children in the UK or elsewhere, as the traditions of child mental health may be quite different (Taylor, 1999b). There is clearly more to the treatment of ADHD than the simple reduction of core symptoms. The MTA study results are also limited in their generalizability to adult populations. Although estimates suggest that around two-thirds of adults with ADHD will show good improvements when treated with stimulants and psychoeducational interventions (Wender, 1998a), there are no random allocation treatment trials that have systematically compared pharmacological to psychoeducational interventions. The issue of comorbidity will also have to be addressed in future treatment studies with adults, as it is likely – as in the case with children – that the presence of other difficulties may affect treatment efficacy (Hornig, 1998).

Conclusions

Attention Deficit Hyperactivity Disorder, once seen as a problem restricted to the school-age years, is now recognized as also occurring in adults. Although ADHD can often co-exist with other learning or behavioural difficulties, the disorder itself functions as a serious risk factor for development. It is hoped that as mental health services for children with ADHD are becoming better organized, more individuals will be accurately identified and appropriately treated. Guidelines for the treatment of ADHD in childhood are available from various sources (Dulcan, 1997; Taylor et al., 1998). Professionals must now grapple with the evidence that ADHD may be a chronic condition. New services for the specific needs of older adolescents and adults with the disorder will need to be developed. For a summary of the clinical issues for practitioners see Table 1.1.

Although treatment of affected individuals can be construed as symptomatic rather than ‘curative’ in focus (Wender, 1998a), the combination of medication

Table 1.1. Summary of clinical issues of attention deficit hyperactivity disorder (ADHD) for practitioners

Assessment	Formulation	Treatment
Should be multi-informant, multi-modal and multidisciplinary. Should include a detailed developmental history, description of current problems and identification of clients' strengths and available resources Measures should include rating scales (parent, teachers), behavioural observation, school reports, and psychological assessment	Hyperkinetic Disorder (ICD-10) ^a or ADHD (DSM-IV) ^b should be specified (if ADHD, use subtypes) Comorbid difficulties and disorders should be included and alternative diagnoses ruled out Multi-axial diagnostic systems should be used to highlight all aspects of child's needs and functioning	Should be multi-modal and individualised for child and family Specific targets should be clearly identified to enable quantification of improvements Treatment plans should be regularly monitored and modified as needed and should capitalize on interpersonal strengths and existing resources (family, school, community)

^a ICD-10 Classification of Mental and Behavioural Disorders (WHO, 1994).

^b Diagnostic and Statistical Manual of Mental Disorders. 4th edition (APA, 1994).

and psychological approaches may be the best means of ensuring long-term improvements in general psychological functioning. When pharmacological approaches are used, it is imperative to monitor behavioural change closely and to be aware of side-effects. Issues of adherence must be considered, especially in adolescence. Psychological approaches may include provision of education to parents, individuals, schools and others regarding the individual's specific needs and treatment. It is important that the initial assessment also serves to identify the individual's strengths and available resources, as these can be valuable when planning and implementing interventions. Behavioural approaches will strive to teach new skills for managing behavioural problems and facilitating the development of more appropriate behaviour. Overall, the goal of all treatments will be to improve the adjustment and well-being of affected individuals by increasing self-control, enhancing understanding of the disorder, and ultimately minimizing its impact.

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